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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.

BEIERSDORF 661-WCG

First Inventor

Dr. Uwe SCHUMANN

Title

[See "Appendix"]

Express Mail Label No.

EF078172034US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☐ Applicant claims small entity status.
See 37 CFR 1.27.
3. ☒ Specification [Total Pages 28]
(preferred arrangement set forth below)
 - Descriptive title of the invention
 - Cross Reference to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to sequence listing, a table, or a computer program listing appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
4. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 1]
5. Oath or Declaration [Total Pages 2]
 - a. ☒ Newly executed (original or copy)
 - b. ☐ Copy from a prior application (37 CFR 1.63 (d))
(for continuation/divisional with Box 17 completed)
 - i. ☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☐ Application Data Sheet. See 37 CFR 1.76

ADDRESS TO:

Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix)
8. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
 - a. ☐ Computer Readable Form (CRF)
 - b. Specification Sequence Listing on:
 - i. ☐ CD-ROM or CD-R (2 copies); or
 - ii. ☐ paper
 - c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. ☒ Assignment Papers (cover sheet & document(s))
10. ☐ 37 CFR 3.73(b) Statement (when there is an assignee) ☒ Power of Attorney
11. ☐ English Translation Document (if applicable)
12. ☒ Information Disclosure Statement (IDS)/PTO-1449 ☒ Copies of IDS Citations
13. ☒ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
15. ☒ Certified Copy of Priority Document(s) (if foreign priority is claimed)
16. ☒ Other: ...Appendix.....

17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP)

of prior application No. _____ / _____

Prior application information:

Examiner _____

Group / Art Unit. _____

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

18. CORRESPONDENCE ADDRESS

☐ Customer Number or Bar Code Label

or ☒ Correspondence address below

(Insert Customer No. or Attach bar code label here)

Name

William C. Gerstenzang

Address

NORRIS, McLAUGHLIN & MARCUS, P.A.

220 East 42nd Street - 30th Floor

City

New York

State

New York

Zip Code

10017

Country

U.S.A.

Telephone

(212) 808-0700

Fax

808-0844

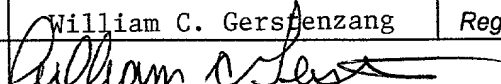
Name (Print/Type)

William C. Gerstenzang

Registration No. (Attorney/Agent)

27,552

Signature



Date

Oct. 27, 2000

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FEE TRANSMITTAL for FY 2001

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT (\$) 710.00

Complete if Known

Application Number	To Be Assigned
Filing Date	Herewith
First Named Inventor	Dr. Uwe SCHUMANN
Examiner Name	To Be Assigned
Group Art Unit	To Be Assigned
Attorney Docket No.	Beiersdorf 661-WCG

METHOD OF PAYMENT

1. ☒ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

Deposit Account Number: **NORRIS, McLAUGHLIN & MARCUS, P.A.**
Deposit Account Name: **14-1263**

- ☐ Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17
☐ Applicant claims small entity status. See 37 CFR 1.27

2. ☐ Payment Enclosed:

☐ Check ☐ Credit card ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
101 710	201 355	Utility filing fee	710
106 320	206 160	Design filing fee	
107 490	207 245	Plant filing fee	
108 710	208 355	Reissue filing fee	
114 150	214 75	Provisional filing fee	

SUBTOTAL (1) (\$) 710.00

2. EXTRA CLAIM FEES

Total Claims	Extra Claims	Fee from below	Fee Paid
7	-20** = 0	18	0
1	-3** = 0	78	0
Multiple Dependent		0	0

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description
103 18	203 9	Claims in excess of 20
102 80	202 40	Independent claims in excess of 3
104 270	204 135	Multiple dependent claim, if not paid
109 80	209 40	** Reissue independent claims over original patent
110 18	210 9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) (\$) 0

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
105 130	205 65	Surcharge - late filing fee or oath	
127 50	227 25	Surcharge - late provisional filing fee or cover sheet	
139 130	139 130	Non-English specification	
147 2,520	147 2,520	For filing a request for <i>ex parte</i> reexamination	
112 920*	112 920*	Requesting publication of SIR prior to Examiner action	
113 1,840*	113 1,840*	Requesting publication of SIR after Examiner action	
115 110	215 55	Extension for reply within first month	
116 390	216 195	Extension for reply within second month	
117 890	217 445	Extension for reply within third month	
118 1,390	218 695	Extension for reply within fourth month	
128 1,890	228 945	Extension for reply within fifth month	
119 310	219 155	Notice of Appeal	
120 310	220 155	Filing a brief in support of an appeal	
121 270	221 135	Request for oral hearing	
138 1,510	138 1,510	Petition to institute a public use proceeding	
140 110	240 55	Petition to revive - unavoidable	
141 1,240	241 620	Petition to revive - unintentional	
142 1,240	242 620	Utility issue fee (or reissue)	
143 440	243 220	Design issue fee	
144 600	244 300	Plant issue fee	
122 130	122 130	Petitions to the Commissioner	
123 50	123 50	Petitions related to provisional applications	
126 240	126 240	Submission of Information Disclosure Stmt	
581 40	581 40	Recording each patent assignment per property (times number of properties)	
146 710	246 355	Filing a submission after final rejection (37 CFR § 1.129(a))	
149 710	249 355	For each additional invention to be examined (37 CFR § 1.129(b))	
179 710	279 355	Request for Continued Examination (RCE)	
169 900	169 900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$) _____

SUBMITTED BY

Name (Print/Type)	Registration No	Telephone	Complete (if applicable)
William C. Gerstenzang	27,552	(212) 808-0700	
Signature	Date		
<i>William C. Gerstenzang</i>	Oct. 27, 2000		

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Attorney Docket No. : Beiersdorf 661-WCG
: 6713-St-ar

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Dr. Uwe SCHÜMANN, Ulrike WAPPLER, Ralf HIRSCH,
Andreas BECKMANN, Andree BERNOTH

For : PROCESS FOR CONTINUOUS MANUFACTURE OF SELF-
ADHESIVE ARTICLES BY COATING INCOMING WEB-FORM
MATERIALS WITH TWO-COMPONENT POLYURETHANES

Serial No. : To Be Assigned

Filed : Herewith

Art Unit : To Be Assigned

Examiner : To Be Assigned

October 27, 2000

BOX PATENT APPLICATIONS
Hon. Assistant Commissioner For Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

In advance of prosecution, the Examiner is respectfully requested to amend the application as follows and consider the following remarks:

IN THE CLAIMS

Claim 2 (amended). The process as claimed in claim 1, wherein a second backing material is supplied [at preferably constant speed] to the polyurethane composition of the laminate and, if desired, is peeled off after the heating tunnel.

Claim 3 (amended). The process as claimed in claim 2, wherein the second backing material [has been] is treated with a pressure-sensitive adhesive composition.

Claim 4 (amended). The process as claimed in [any of claims 1 to 3] claim 1, wherein upstream of the mixer there are further containers for catalysts, plasticizers, dyes and other additives, which [may be] optionally are introduced and added.

Claim 5 (amended). The process as claimed in [any of claims 1 to 4] claim 1, wherein polyurethane composition is applied to the first backing material coated with a pressure-sensitive adhesive composition, said application taking place in such a way that the polyurethane composition is present on the pressure-sensitive adhesive composition.

Claim 6 (amended). The process as claimed in [any of claims 1 to 5] claim 2, wherein the first or second backing material used comprises a dehesive media[, such as a release paper or a release film or paper, woven, nonwoven, film, or an elastomer].

Claim 7 (amended). A single- or double-sided self-adhesive tape obtained by a process as claimed in [one or more of the preceding claims] claim 1.

Please add the following:

-- Claim 8. The process of claim 6 wherein said dehesive media is selected from the group consisting of release paper, release film, a woven, a nonwoven, film or an elastomer. --

REMARKS

This Preliminary Amendment is being filed to conform the claims to conventional format and to eliminate multiple dependency.

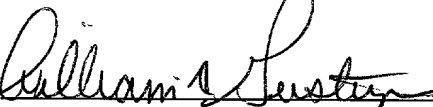
Favorable action is respectfully solicited.

ADDITIONAL FEE

Please charge any insufficiency of fees, or credit any excess, to Deposit Account No. 14-1263.

Respectfully submitted,

NORRIS, McLAUGHLIN & MARCUS, P.A.

By 
William C. Gerstenzang
Reg. No. 27,552

220 East 42nd Street - 30th Floor
New York, New York 10017
(212) 808-0700

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Norris McLaughlin & Marcus, P.A.

By: 

Date: 10/27/00

Beiersdorf Aktiengesellschaft
Hamburg

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Description

Process for continuous manufacture of self-adhesive articles by coating incoming web-form materials with two-component polyurethanes

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The present invention relates to a process for the continuous production of self-adhesive articles such as, for example, self-adhesive tapes by coating an incoming material in web form or two simultaneously incoming web-form materials, disposed with their surfaces parallel above but not in contact with one another, with a reactive, two-component polyurethane backing material, at least one of the incoming web-form materials having been treated with a pressure-sensitive adhesive composition (self-adhesive composition).

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Single-sided self-adhesive articles comprise at least two layers (laminae), namely the backing layer, which is not self-adhesive, and the pressure-sensitive adhesive composition applied to it. A double-sided self-adhesive tape is generally composed of at least three layers, namely the backing layer and the pressure-sensitive adhesive layers applied to it on both sides. Exceptions are double-sided self-adhesive articles wherein backing and adhesive layer are identical (known as single-layer products).

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The mechanical properties of an adhesive tape (for example, tensile strength, extensibility, elasticity) are essentially determined by the backing. The backing, moreover, largely determines the optical properties of an adhesive tape (transparency, color) and, in the case of a single-sided self-adhesive article, the surface properties of the side which is not self-adhesive (texture, roughness, surface tension). The backing material is also a co-determinant of the adhesion properties of a self-adhesive article.

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Appropriate backing materials include all materials in web form, for example papers, wovens, nonwovens, films or elastomers, each with different thicknesses, textures and polymer compositions.

US 6,640,410 B2

In combination with the respective backing that is used, the adhesive layer critically determines the adhesion properties of a self-adhesive article, which are manifested, inter alia, in shear stability times, bond strengths, tip-shear behavior, peel increase behavior, redetachability, et cetera.

The base polymers of modern pressure-sensitive adhesives include natural and synthetic rubbers, polyacrylates, block copolymers with polystyrene block fractions, polyethylene-vinyl acetates and polyurethanes, which are usually used in combination with additives such as resins and plasticizers and/or other auxiliaries such as, for example, antioxidants, UV stabilizers or rheological additives.

The widespread general process for producing adhesive tapes comprises coating a separately produced, web-form backing material with an adhesive composition. The coating operation is normally carried out from a solution, i.e., the pressure-sensitive adhesion composition is converted to a spreadable consistency, using solvents, prior to coating.

Alternatively, and depending on the polymer composition, coating may also be effected from the melt, without solvent, in an extrusion process. This process has become established in particular in the case of pressure-sensitive adhesives based on thermoplastic elastomers.

Moreover, the assembly of backing and pressure-sensitive adhesive composition may also be produced by first applying the pressure-sensitive adhesive composition to a dehesive medium and subsequently applying it to the backing in a laminating process.

The coating of web-form backing materials with pressure-sensitive adhesive compositions is very well established as a process for producing self-adhesive articles.

Nevertheless, there are a number of fundamental disadvantages which are disruptively manifested in particular in the case of adhesive tapes having high or very specific profiles of requirements. For instance, in many cases the anchoring of the adhesive composition on the backing is a problem and requires a further process step, namely coating with a primer (pre-coat). In the case of a double-sided adhesive tape, of course, this must be

done on both sides, so resulting in a five-layer product structure. Moreover, there are occasionally no tailor-made backings available on the market, as are required for specific applications. In that case, either recourse is had to composite systems comprising individual backings, a further disadvantage of which is that they have to be joined using, for example, primer and adhesive systems, or else additional auxiliary layers are applied (for example, barrier layers preventing the migration of ingredients from the backing into the adhesive layer, or mirror layers for smoothing rough backing surfaces). All this results in increased complexity in the production process, and, ultimately, increased production costs.

In the text below, by way of example, a number of adhesive tapes from the comprehensive prior art are depicted, specifically those where polyurethanes or polyurethane films are used as the backing material.

WO 86/00536 A1 discloses a laminate comprising a polyurethane and a pressure-sensitive adhesive layer, the laminate being used for a pellet package and, respectively, administration form. A polyurethane film, without further treatment, is provided with a self-adhesive coating which envelopes a pellet and at the same time is bonded with the pellet to the skin of the user.

US 5,127,974 A mentions a laminate comprising a polyurethane film with a self-adhesive coating. This laminate is used especially for the temporary protection of coated automobile surfaces.

DE 196 14 620 A1 and DE 197 33 014 A1 disclose a pressure-sensitive adhesive tape, coated on both sides with adhesive compositions, whose backing is formed by a formulated, crosslinked, unfoamed polyurethane.

Formulation constituents of the backing are a crosslinked, unfoamed polyurethane, fillers, and, if desired, further auxiliaries.

According to DE 196 14 620 A1, the polyurethane content of the backing is up to 50% by weight, preferably from 30% by weight to 40% by weight, the polyurethane being plasticizer-free. The fillers account for from 50% by weight to 70% by weight of the backing.

According to DE 197 33 014 A1, the polyurethane content of the backing is up to 50% by weight, preferably from 10% by weight to 40% by weight. The fillers account for from 40% by weight to 70% by weight of the backing, while the plasticizers and resins together are used at from 5% by weight to 30% by weight, in particular from 10% by weight to 25% by weight.

It is an object of the present invention to provide a process with which self-adhesive articles may be produced continuously without the need to produce separately the web-form backing material of the self-adhesive article and then coat it with an adhesive composition, directly or by a laminating process, so that the fundamental disadvantages of the conventional production processes for adhesive tapes are unable to occur in the form. The backing is to be distinguished by a profile of properties which can be adjusted variably and diversely.

This object is achieved by a process as specified in the main claim. The subclaims relate to advantageous embodiments of the process. Finally, the concept of the invention also embraces self-adhesive articles produced by the process of the invention.

The invention accordingly provides the process described below for continuous production of self-adhesive articles whose backing comprises a polyurethane as base polymer.

The process of the invention is composed of the following individual steps:

- a) Essentially one polyol component is placed in a container A and essentially one isocyanate component is placed in a container B.
- b) The polyol component and the isocyanate component are mixed in a mixer.
- c) The polyurethane composition thus mixed is applied to a backing material which is coated with a pressure-sensitive adhesive composition and moves preferably at constant speed.
- d) The laminate, comprising backing material, pressure-sensitive adhesive composition and polyurethane composition, is passed through a heat tunnel, in which the polyurethane composition cures.
- e) The laminate is finally wound in a winding station.

In a preparation step, the backing material is treated on both sides, or in particular on one side, with a pressure-sensitive adhesive composition. This treatment takes place in a customary coating process, either from a solution or from the melt.

5 The backing material may be a dehesive medium, for example, a release paper or a release film. Alternatively, it may comprise any desired other backing material, for example, a paper, a woven, a nonwoven, a film or an elastomer, which after the last process step constitutes part of the overall backing of the self-adhesive article.

10 Where the backing material is a dehesive medium, the polyurethane composition is applied to the backing material coated with a pressure-sensitive adhesive composition, said application taking place such that the polyurethane composition is present on the pressure-sensitive adhesive composition.

15 Where the backing material is not a dehesive medium, the polyurethane composition is applied preferably to that side of the backing material on which there is no pressure-sensitive adhesive composition. Alternatively, however, in this case as well the polyurethane composition may be applied to the pressure-sensitive adhesive composition. If so, a further layer of adhesive should be applied to the outer face of the backing material.

20 In another preferred embodiment of the process, a second backing material is supplied at preferably constant speed to the polyurethane composition of the laminate.

In another preferred embodiment of the process, the second backing material has been treated with a pressure-sensitive adhesive composition.

25 In this case, an additional preparation step is necessary, in which the first preparation step is repeated accordingly, neither the pressure-sensitive adhesive composition nor the web-form material necessarily being identical with those from the first preparation step.

If desired, after the heating tunnel, the second backing material is peeled off.

Also advantageous are further containers upstream of the mixer, containing catalysts, plasticizers, dyes and other additives, which may be introduced and added.

30 Coating with the reactive, two-component polyurethane onto the first backing material takes place preferably on a standard coating unit for the production of adhesive tapes.

Figure 1 depicts such a unit in a preferred embodiment.

The unit 100 possesses two bale unwinders 11, 12 for the incoming materials 1 and 2, and also a product winding station 21 and a bale winder 22 for any auxiliary material 3 that may become uncovered. Moreover, the unit 100 has a heating tunnel 31 in which the polyurethane composition 4 is cured.

- 5 The incoming, web-form materials 1 and 2 are guided so that the coating of the polyurethane composition 4 may take place directly in the gap between the two materials 1 and 2. The gap width is variable and freely adjustable.

- 10 Behind the gap, a web guide, not shown here, for the second backing material 2, via a belt, is advantageous with regard to the achievement of a good constancy of thickness of the polyurethane backing material 4.

In the case of a single-sided self-adhesive article, the upper bale unwinder and the bale winder for the auxiliary material 3 to be uncovered may, if appropriate, be omitted.

- 15 Alternatively, a dehesive material may be used whose function is merely to keep the shaft and the reactive polymer from coming into contact with one another, in order to avoid instances of curing of the polyurethane on the shaft.

- 20 The reactive polyurethane backing composition 4 is prepared continuously, directly before its application, from two components which react chemically with one another, namely a generally preformulated polyol component (A) and an isocyanate component (B), both of which are present in containers 41 and 42, respectively, preparation taking place in a mixing head (dynamic mixer) or a mixing pipe (static mixer) of a standard two-component mixing and metering unit 43, and are applied directly between the incoming, 25 web-form materials 1 and 2.

- A suitable two-component mixing and metering unit 43 is any corresponding standard commercial unit which is suitable for casting and is designed for short pot lives of generally less than one minute. It may be actualized either in a static system or else in a dynamic mixing system. In order to be able to coat the full width of the incoming 30 materials 1 and, if appropriate, 2 with the polyurethane backing material 4, it is advantageous to install the mixing head or the mixing pipe such that it is movable on a traversing device, which then permanently travels the width of the incoming materials, in an oscillating manner.

In the subsequent heating tunnel section 31, the reactive polyurethane composition 4 cures to the desired backing material and, in general, attaches chemically to the incoming materials, i.e., in particular, adhesive coatings. Attachment to an acrylate takes place, for example, through the formation of a carboxamide. After the tunnel section 31, the finished product is wound up.

The heating tunnel section 31 is held preferably at temperatures between 20°C and 120°C.

In the case of a double-sided adhesive tape, a three-layer product structure is obtained, comprising adhesive composition, polyurethane backing, and adhesive composition. There is no need for a primer, nor for any other additional layer. The backing thickness is easily adjusted by way of the gap width on the applicator unit. Since the polyurethane components (A) and (B) contain no solvent, even very thick backings can be produced without bubbles using this process.

In one possible embodiment, the backing has a thickness of from 0.1 to 50 mm, preferably from 0.4 to 20 mm. The adhesive composition preferably has an application weight of from 10 g/m² to 100 g/m².

Suitable polyurethane backing materials are all materials which comprise a polyurethane as base polymer and may be prepared in a two-component mixing process. The diversity of polyurethane chemistry, resulting both from the fullness of the polyurethane building blocks provided by the chemical base-materials industry and from the diverse possibilities of compounding with fillers, resins, plasticizers, other polymers, for example, epoxides, acrylates, natural and synthetic rubbers, ethylene-vinyl acetates, block copolymers with polystyrene block fractions, and other additives such as aging inhibitors, UV stabilizers or rheological additives, for instance, makes it possible to use this process to provide self-adhesive articles tailored to many fields of application.

Also suitable as the polyurethane backing material are all foamed materials which comprise a polyurethane as base polymer and may be prepared in a multicomponent mixing process. The foam structure may be achieved either chemically, for example, by means of an isocyanate/water reaction initiated during the mixing operation, or by blowing agents, or else physically, by the introduction of a gas (for example, nitrogen or air). The gas may be introduced both during the preparation of the A or B component and directly at the mixing head of a multicomponent mixing and metering unit. The gas

introduced into the mixing head represents, so to speak, the special case of a third component.

Express reference may be made to the depiction of the state of the art polyurethane chemistry in "Kunststoff-Handbuch" 7, Polyurethane, Becker/Braun (1993).

One possible embodiment of the backing comprises as formulation constituents a crosslinked, unfoamed polyurethane, fillers, and, if desired, further auxiliaries.

The polyurethane content of the backing is up to 50% by weight, preferably from 30% by weight to 40% by weight, the polyurethane being plasticizer-free. The fillers account for from 50% by weight to 70% by weight of the backing.

The isocyanate component of the polyurethane is selected in accordance with the specific properties to be established in the backing. Suitable examples include tolylene diisocyanate, diphenylmethane 4,4'-diisocyanate, dicyclohexylmethane 4,4'-diisocyanate, hexamethylene diisocyanate, isophorone diisocyanate, mixtures of the aforementioned isocyanates or isocyanates derived chemically therefrom, for example, dimerized or trimerized types.

The isocyanate-reactive component is likewise selected in accordance with the properties of the backing, which are to be established as a function of the desired profile of requirements. Suitable examples include all polyester diols, triols and polyols, polyether diols, triols and polyols, polyether diamines, triamines and polyamines, hydroxyl-functionalized polybutadiene, and also all monohydric alcohols (mono-ols), monofunctional amines (mono-amines), polyether mono-ols, polyether mono-amines, or products derived from the four last-mentioned groups.

It has been found advantageous if the hydroxyl-functionalized polybutadienes, the polyester diols, the polyester triols, the polyester polyols, the polyether diols, the polyether triols, the polyether polyols, the polyether diamines, the polyether triamines, or the polyether polyamines have a molecular weight $M_w \geq 1000$ g/mol.

In addition to the isocyanate components recited above and the components which react with them, however, it is also possible to use other starting materials to form the polyurethane, without departing from the concept of the invention.

In order to accelerate the reaction between the isocyanate component and the isocyanate-reactive component, it is possible to use all catalysts known to the skilled worker, such as, for example, tertiary amines or organotin compounds.

- 5 Polyurethanes as described above are mentioned, for example, in "Ullmann's Encyclopedia of Industrial Chemistry, Vol. A21: Polyurethanes".

In one particularly preferred embodiment, an NCO/OH ratio of from 1.0 to 1.3 is established in order to form the polyurethane, preferably from 1.0 to 1.1.

10

The preferred mono-ol OH content as a proportion of the overall OH content, i.e., the preferred chain-terminating component, is between 5% and 40%, in particular between 10% and 30%.

15

Fillers which may be used include both reinforcing types, such as carbon black, for example, and nonreinforcing types, such as chalk or barium sulfate, for example. Further examples are talc, mica, pyrogenic silica, silicates, zinc oxide, microballoons, solid glass microbeads, hollow glass microbeads, and/or plastic microbeads of all kinds. Mixtures of the materials mentioned may also be used.

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The microballoons comprise elastic, thermoplastic hollow beads which have a polymer shell. These beads are filled with low-boiling liquids or with liquefied gas. Suitable shell polymers are, in particular, acrylonitrile, PVDC, PVC or acrylates. Hydrocarbons such as the lower alkanes, for example, pentane, are suitable as a low-boiling liquid, while a suitable liquefied gas is a chemical such as isobutane.

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Particularly advantageous properties are in evidence when the microballoons involved are those having a diameter at 25°C of from 3 μm to 40 μm , in particular from 5 μm to 20 μm .

On exposure to heat, the capsules expand irreversibly and three-dimensionally.

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Expansion is at an end when the internal pressure equals the external pressure. In this way, a closed-cell foam backing is obtained which features good flow behavior and high recovery forces.

Following thermal expansion due to elevated temperature, the microballoons advantageously have a diameter of from 20 μm to 200 μm , in particular from 40 μm to 100 μm .

- 5 To enhance the stability of the polyurethane with respect to aging, it may be blended with customary aging inhibitors, which depending on the application in point may come from the class of the discoloring or nondiscoloring aging inhibitors, in the range between 0% by weight and 5% by weight, and also known light stabilizers, in the range between 0% by weight and 5% by weight, or ozone protectants, in the range between 0% by weight and 5% by weight.

To achieve freedom from bubbles, furthermore, it is possible to admix siccatives, such as calcium oxide or molecular sieve zeolites, for example, to the formulation, in particular in the range between 0% by weight and 10% by weight.

- 15 Depending on the intended use, all of the abovementioned auxiliaries may be used, either alone or in any desired combination, to prepare the polyurethane composition, in order to tailor it optimally to the use. The use of these additives also enables the composition to be colored black, as required in particular by the automotive industry, without problems.

- 20 The A and B components are either purchased directly or prepared from individual purchased components in accordance with customary mixing or preparation processes which accord with the prior art, for example, depending on rheological setting and filler content, in a stirred vessel, in a planetary mixer, or in a dissolver.

- 25 The particular feature of the process of the invention is the inverted nature of the coating operation.

- 30 Instead of the usual application of a pressure-sensitive adhesive composition to a backing, a reactive, initially liquid backing material is instead applied to a pressure-sensitive adhesive composition which has already been introduced, or, if appropriate, to other incoming materials, of which at least one has been treated with a pressure-sensitive adhesive composition.

- 35 One advantage of the process is to be able to achieve effective anchoring between the polyurethane backing material and the incoming, web-form materials, i.e., for example,

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- The bond strength was determined in accordance with BDF JOPMA002.

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- 35

In this test, a test strip 100 mm in length and 25 mm in width was stretched in the lengthwise direction in a tensile testing machine at defined clamp speed (300 mm/min)

until it tore. The parameters measured were the tensile strength, based on the cross section of the sample, and the extension at the point of tear.

- The compressive strength was determined in accordance with DIN 53577.

5 The compressive strength is the compression strain determined at a defined deformation (in the Examples 14%) during the stress operation. It was measured in a compressive testing machine. The dimensions of the test specimens were 30 mm x 30 mm x 15 mm (LxWxH). The height of the test specimens was produced by stacking the adhesive strips.

10

Coating in the examples was carried out on a unit from the company Pagendarm. The unit possessed the unwinding and winding facilities shown in Figure 1 for the incoming materials 1 and 2 with a web width of 50 cm. The coating gap width was variably
15 adjustable between 0 and 1 cm. The length of the heating tunnel was approximately 12 m. The temperature in the heating tunnel was divisible into four zones and freely selectable in each case between room temperature and 120°C.

20 A two-component mixing and metering unit from the company Spritztechnik-EMC was used. The mixing system was dynamic. The mixing head was designed for two liquid and a third gaseous component. The mixing rotor had a variable speed of up to approximately 5000 rpm max. The metering pumps of this unit were toothed-wheel pumps having a maximum output of approximately 2 l/min.

25 The A components were prepared in an evacuable dissolver from the company Drais.

Examples

30

Example 1

To produce a special masking tape, which is used following the application of the first coat (cathodic electrocoat) to mask off the window flange joints during the coating

1st process step (preparation step), production of the incoming material 1:

48%	natural rubber CV50
23%	poly-beta-pinene resin
5%	terpene phenolic resin
3%	rosin
7%	copolymer of acrylonitrile and butadiene
8%	zinc oxide
5%	reactive alkylphenol resin, and
1%	2,5 di(tert-amyl)hydroquinone

2nd process step, polyurethane coating:

The makeup of the polyurethane backing composition was as follows:

	Raw material	Weight fraction [% by weight]
A component	Arcol 1030 ®	30.0
	Arcol 1074 ®	10.0
	Dibutyltin dilaurate	0.2
	Calcium oxide	5.0
	Bayferrox 3920 ®	1.0
	Omyacarb 4BG ®	28.3
B component	Vestanat IPDI ®	25.5

The resultant adhesive tape had a tensile strength of 30.3 N/mm² with an elongation at break of 43.4%. The bond strength on steel was 4.9 N/cm.

The adhesive tape was overpaintable and was sufficiently temperature-stable in view of the paint baking conditions.

Example 2

To produce a special masking tape, which is used as in Example 1 following the application of the first coat (CED coating material) to mask off the window flange joints during the coating process in the OEM production of automobiles, and so protect them against further coats which are baked at temperatures of up to 180°C, and which is also so flexible that it can easily be stuck on in curves, the process was used as follows:

1st process step (preparation step), production of the incoming material 1:

A solvent-based acrylate pressure-sensitive adhesive composition consisting of butyl acrylate (47.5%), ethylhexyl acrylate (47.5%), glycidyl methacrylate (2%), acrylic acid (3%), and small amounts of a known crosslinker was applied in an application thickness of 40 g/m² to standard commercial double-sided release paper, dried, crosslinked and subsequently wound up.

2nd process step, polyurethane coating:

- 5 In the 2nd process step, the acrylate pressure-sensitive adhesive composition applied to the release paper was coated directly with a devolatilized, two-component polyurethane backing composition at a rate of 3 m/min. The application thickness was 250 μm . Curing was effected at a tunnel temperature of 60 to 70°C.

The makeup of the polyurethane backing composition was as follows:

	Raw material	Weight fraction [% by weight]
A component	Poly THF 250 ®	14.3
	Poly THF 650 ®	37.6
	Dibutyltin dilaurate	0.1
	Calcium oxide	10.0
	Bayferrox 3920 ®	1.3
	Aerosil R 202 ®	2.0
B component	Desmodur CD ®	34.7

- 10 The resultant adhesive tape had a tensile strength of 20.0 N/mm² with an elongation at break of 195%. The bond strength on steel was 2.5 N/cm. The adhesive tape was overpaintable and was sufficiently temperature-stable in view of the paint baking conditions, and could be stuck on in curves.

15

Example 3

To produce an elastic, sandblast-resistant, punchable adhesive stencil tape, the process was used as follows:

- 20 1st process step (preparation step), production of the incoming material 1:

A solvent-based acrylate pressure-sensitive adhesive composition consisting of butyl acrylate (47.5%), ethylhexyl acrylate (47.5%), glycidyl methacrylate (2%), acrylic acid (3%), and small amounts of a known crosslinker was applied in an application thickness

of 40 g/m² to standard commercial double-sided release paper, dried, crosslinked and subsequently wound up.

2nd process step, polyurethane coating:

5

In the 2nd process step, the acrylate pressure-sensitive adhesive composition applied to the release paper was coated directly with a devolatilized, two-component polyurethane backing composition at a rate of 3 m/min. The application thickness was 875 μ m. Curing was effected at a tunnel temperature of 60 to 70°C.

10 The makeup of the polyurethane backing composition was as follows:

	Raw material	Weight fraction [% by weight]
A component	Arcol 1042 ®	29.0
	Dibutyltin dilaurate	0.1
	Omyacarb 4BG ®	63.1
	Calcium oxide	5.0
B component	Desmodur CD ®	2.8

The resultant adhesive tape had a tensile strength of 1.7 N/mm² with an elongation at break of 124%. The bond strength on steel was 2.5 N/cm. The adhesive tape was sufficiently resistant to sandblasting, and was readily punchable.

15

Example 4

20 To produce a sandblast-resistant, punchable adhesive stencil tape of low extensibility at low applied force, the process was used as follows:

1st process step (preparation step), production of the incoming material 1:

25 A solvent-based acrylate pressure-sensitive adhesive composition consisting of butyl acrylate (47.5%), ethylhexyl acrylate (47.5%), glycidyl methacrylate (2%), acrylic acid (3%), and small amounts of a known crosslinker was applied in an application thickness

of 40 g/m² to standard commercial slightly creped paper backing with a basis weight of 68 g/m², dried, crosslinked and, during winding up, was lined with a standard commercial release paper.

5 2nd process step, polyurethane coating:

In the 2nd process step, the slightly creped paper backing treated with the pressure-sensitive adhesive composition was coated from the nonadhesive side with a devolatilized, two-component polyurethane backing composition at a rate of 3 m/min. The application thickness was 850 μ m. Curing was effected at a tunnel temperature of 60 to 70°C.

The makeup of the polyurethane backing composition was as follows:

	Raw material	Weight fraction [% by weight]
A component	Arcol 1042 ®	29.0
	Dibutyltin dilaurate	0.1
	Omyacarb 4BG ®	63.1
	Calcium oxide	5.0
B component	Desmodur CD ®	2.8

The resultant adhesive tape was sufficiently resistant to sandblasting, and was readily punchable. The bond strength on steel was 2.1 N/cm.

Example 5

To produce a sandblast-resistant, punchable adhesive stencil tape of low extensibility at low applied force, the process was used as follows:

25 1st process step (preparation step), production of the incoming material 1:

A solvent-based acrylate pressure-sensitive adhesive composition consisting of butyl acrylate (47.5%), ethylhexyl acrylate (47.5%), glycidyl methacrylate (2%), acrylic acid (3%), and small amounts of a known crosslinker was applied in an application thickness of 40 g/m² to a standard commercial polyester (polyethylene terephthalate) film with a thickness of 23 μ m, dried, crosslinked and, during winding up, was lined with a standard commercial release paper.

2nd process step, polyurethane coating:

In the 2nd process step, the polyester film treated with the pressure-sensitive adhesive composition was coated from the nonadhesive side with a devolatilized, two-component polyurethane backing composition at a rate of 3 m/min. The application thickness was 850 μ m. Curing was effected at a tunnel temperature of 60 to 70°C.

The makeup of the polyurethane backing composition was as follows:

	Raw material	Weight fraction [% by weight]
A component	Arcol 1042 ®	29.0
	Dibutyltin dilaurate	0.1
	Omyacarb 4BG ®	63.1
	Calcium oxide	5.0
B component	Desmodur CD ®	2.8

The resultant adhesive tape was sufficiently resistant to sandblasting, and was readily punchable. The bond strength on steel was 2.8 N/cm.

Example 6

To produce an elastic masking tape which is easy to stick on in curves and is suitable for general painting and decorating work, the process was used as follows:

1st process step (preparation step), production of the incoming material 1:

A solvent-based acrylate pressure-sensitive adhesive composition consisting of butyl acrylate (47.5%), ethylhexyl acrylate (47.5%), glycidyl methacrylate (2%), acrylic acid (3%), and small amounts of a known crosslinker was applied in an application thickness of 40 g/m² to standard commercial double-sided release paper, dried, crosslinked and then wound up.

2nd process step, polyurethane coating:

In the 2nd process step, the acrylate pressure-sensitive adhesive composition applied to the release paper was coated directly with a devolatilized, two-component polyurethane backing composition at a rate of 3 m/min. The application thickness was 300 μ m. Curing was effected at a tunnel temperature of 60 to 70°C.

The makeup of the polyurethane backing composition was as follows:

	Raw material	Weight fraction [% by weight]
A component	Arcol 1074 ®	31.5
	Lutensol A07 ®	3.3
	Dibutyltin dilaurate	0.1
	Calcium oxide	7.9
	Omyacarb 4BG ®	53.9
B component	Desmodur CD ®	3.3

The resultant adhesive tape had a tensile strength of 2.1 N/mm² with an elongation at break of 194%. The bond strength on steel was 2.5 N/cm. The adhesive tape was overpaintable and could be stuck on in curves.

Example 7

To produce an adhesive edge-protection tape, the process was used as follows:

1st process step (preparation step), production of the incoming material 1:

- A solvent-based acrylate pressure-sensitive adhesive composition consisting of butyl acrylate (47.5%), ethylhexyl acrylate (47.5%), glycidyl methacrylate (2%), acrylic acid (3%), and small amounts of a known crosslinker was applied in an application thickness of 40 g/m² to a woven backing made from closely woven polyester (20×20 threads per cm in warp and weft direction, metric count: 34, basis weight > 130 g/m²), dried, crosslinked and, during winding up, was lined with a standard commercial release paper.

2nd process step, polyurethane coating:

- In the 2nd process step, the woven fabric treated with the pressure-sensitive adhesive composition was coated from the nonadhesive side with a devolatilized, two-component polyurethane backing composition at a rate of 3 m/min. The application thickness was 400 μm. Curing was effected at a tunnel temperature of 60 to 70°C.

The makeup of the polyurethane backing composition was as follows:

	Raw material	Weight fraction [% by weight]
A component	Arcol 1042 ®	29.0
	Dibutyltin dilaurate	0.1
	Omyacarb 4BG ®	63.1
	Calcium oxide	5.0
B component	Desmodur CD ®	2.8

The resultant adhesive tape had a tensile strength of 19.1 N/mm² with an elongation at break of 24%. The bond strength on steel was 2.9 N/cm.

Example 8

To produce a particularly cost-effective adhesive edge-protection tape, the process was used as follows:

- 1st process step (preparation step), production of the incoming material 1:

A solvent-based acrylate pressure-sensitive adhesive composition consisting of butyl acrylate (47.5%), ethylhexyl acrylate (47.5%), glycidyl methacrylate (2%), acrylic acid (3%), and small amounts of a known crosslinker was applied in an application thickness of 40 g/m² to a 150 μ m thick spunbonded polyester nonwoven with a basis weight of 70 g/m², dried, crosslinked and, during winding up, was lined with a standard commercial release paper.

2nd process step, polyurethane coating:

In the 2nd process step, the spunbonded nonwoven treated with the pressure-sensitive adhesive composition was coated from the nonadhesive side with a devolatilized, two-component polyurethane backing composition at a rate of 3 m/min. The application thickness was 400 μ m. Curing was effected at a tunnel temperature of 60 to 70°C.

The makeup of the polyurethane backing composition was as follows:

	Raw material	Weight fraction [% by weight]
A component	Arcol 1042 ®	29.0
	Dibutyltin dilaurate	0.1
	Omyacarb 4BG ®	63.1
	Calcium oxide	5.0
B component	Desmodur CD ®	2.8

The resultant adhesive tape had a tensile strength of 9.8 N/mm² with an elongation at break of 18%. The bond strength on steel was 2.6 N/cm.

Example 9

To produce an adhesive printing plate mounting strip for the printing industry, the process was used as follows:

1st process step (preparation step), production of the incoming material 1:

A solvent-based acrylate pressure-sensitive adhesive composition consisting of ethylhexyl acrylate (70%), stearyl acrylate (17%), acrylic acid (3%), and known resins (10%) was applied in an application thickness of 60 g/m² to standard commercial double-sided release paper, dried and subsequently wound up.

5

2nd process step (preparation step), production of the incoming material 2:

Process step 1 was repeated.

10 3rd process step, polyurethane coating:

Between the acrylate pressure-sensitive adhesive compositions from process steps 1 and 2, applied to the release papers, coating took place with a devolatilized, two-component polyurethane backing composition at a rate of 1 m/min. The application thickness was 1.5 mm. Curing was effected at a tunnel temperature of 90°C.

15

The makeup of the polyurethane backing composition was as follows:

	Raw material	Weight fraction [% by weight]
A component	Arcol 1042 ®	41.0
	Arcol 1043 ®	41.0
	Dibutyltin dilaurate	0.2
	Kronos 2160 ®	1.6
	Calcium oxide	5.0
	Aerosil R 202 ®	3.5
B component	Vestanat IPDI ®	7.7

The resultant adhesive tape had a compressive strength H_{14} of 22 N/cm². The bond strength on steel was 3.4 N/cm.

20

Example 10

To produce a microballoon-foamed adhesive printing plate mounting strip for the printing industry, the process was used as follows:

25

1st process step (preparation step), production of the incoming material 1:

- 5 A solvent-based acrylate pressure-sensitive adhesive composition consisting of ethylhexyl acrylate (70%), stearyl acrylate (17%), acrylic acid (3%), and known resins (10%) was applied in an application thickness of 60 g/m² to standard commercial double-sided release paper, dried and subsequently wound up.

2nd process step (preparation step), production of the incoming material 2:

10

Process step 1 was repeated.

3rd process step, polyurethane coating:

- 15 Between the acrylate pressure-sensitive adhesive compositions from process steps 1 and 2, applied to the release papers, coating took place with a devolatilized, two-component polyurethane backing composition at a rate of 1 m/min. The application thickness was 1.5 mm. Curing was effected at a tunnel temperature of 90°C.

- 20 The polyurethane backing composition contained preexpanded thermoplastic hollow beads (Expancel ®) and its makeup was as follows:

	Raw material	Weight fraction [% by weight]
A component	Arcol 1042 ®	39.5
	Arcol 1043 ®	39.5
	Dibutyltin dilaurate	0.2
	Kronos 2160 ®	1.9
	Calcium oxide	5.0
	Expancel 551 DE 80 ®	3.0
	Aerosil R 202 ®	3.5
B component	Vestanat IPDI ®	7.4

The resultant adhesive tape had a compressive strength H_{14} of 30 N/cm². The bond strength on steel was 2.9 N/cm.

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Example 11

To produce a nitrogen-foamed adhesive printing plate mounting strip for the printing industry, the process was used as follows:

10 1st process step (preparation step), production of the incoming material 1:

A solvent-based acrylate pressure-sensitive adhesive composition consisting of ethylhexyl acrylate (70%), stearyl acrylate (17%), acrylic acid (3%), and known resins (10%) was applied in an application thickness of 60 g/m² to standard commercial double-
15 sided release paper, dried and subsequently wound up.

2nd process step (preparation step), production of the incoming material 2:

Process step 1 was repeated.

20

3rd process step, polyurethane coating:

Between the acrylate pressure-sensitive adhesive compositions from process steps 1 and 2, applied to the release papers, coating took place with a devolatilized, two-
25 component polyurethane backing composition at a rate of 1 m/min. Nitrogen was introduced into the polyurethane backing composition directly at the mixing head, so that the cured backing had a density of 0.7 g/cm³. The application thickness was 1.5 mm. Curing was effected at a tunnel temperature of 90°C.

The makeup of the polyurethane backing composition was as follows:

	Raw material	Weight fraction [% by weight]
A component	Arcol 1030 ®	17.0
	Arcol 1067S ®	40.0
	Dibutyltin dilaurate	0.2
	Kronos 2160 ®	2.4
	Calcium oxide	9.0
	Aerosil R 202 ®	3.5
B component	Vestanat IPDI ®	27.9

The resultant adhesive tape had a compressive strength H_{14} of 28 N/cm². The bond strength on steel was 2.7 N/cm.

002201-42436960

What is claimed is:

1. A process for continuous production of self-adhesive articles, wherein
 - a) essentially one polyol component is placed in a container A and essentially one isocyanate component is placed in a container B,
 - 5 b) the polyol component and the isocyanate component are mixed in a mixer,
 - c) the polyurethane composition thus mixed is applied to a backing material which is coated with a pressure-sensitive adhesive composition and moves preferably at constant speed,
 - 10 d) the laminate, comprising first backing material, pressure-sensitive adhesive composition and polyurethane composition, is passed through a heat tunnel, in which the polyurethane composition cures,
 - e) the laminate is wound in a winding station.
2. The process as claimed in claim 1, wherein a second backing material is supplied at preferably constant speed to the polyurethane composition of the laminate and, if desired, is peeled off after the heating tunnel.
3. The process as claimed in claim 2, wherein the second backing material has been treated with a pressure-sensitive adhesive composition.
- 20 4. The process as claimed in any of claims 1 to 3, wherein upstream of the mixer there are further containers for catalysts, plasticizers, dyes and other additives, which may be introduced and added.
- 25 5. The process as claimed in any of claims 1 to 4, wherein polyurethane composition is applied to the first backing material coated with a pressure-sensitive adhesive composition, said application taking place in such a way that the polyurethane composition is present on the pressure-sensitive adhesive composition.
- 30 6. The process as claimed in any of claims 1 to 5, wherein the first or second backing material used comprises adhesive media, such as a release paper or a release film or paper, woven, nonwoven, film, or an elastomer.

7. A single- or double-sided self-adhesive tape obtained by a process as claimed in one or more of the preceding claims.

2020110136960

Abstract

A process for continuous production of self-adhesive articles, wherein

- 5 a) essentially one polyol component is placed in a container A and essentially one isocyanate component is placed in a container B,
- b) the polyol component and the isocyanate component are mixed in a mixer,
- c) the polyurethane composition thus mixed is applied to a backing material which is coated with a pressure-sensitive adhesive composition and moves preferably at
- 10 constant speed,
- d) the laminate, comprising first backing material, pressure-sensitive adhesive composition and polyurethane composition, is passed through a heat tunnel, in which the polyurethane composition cures,
- e) the laminate is wound in a winding station.

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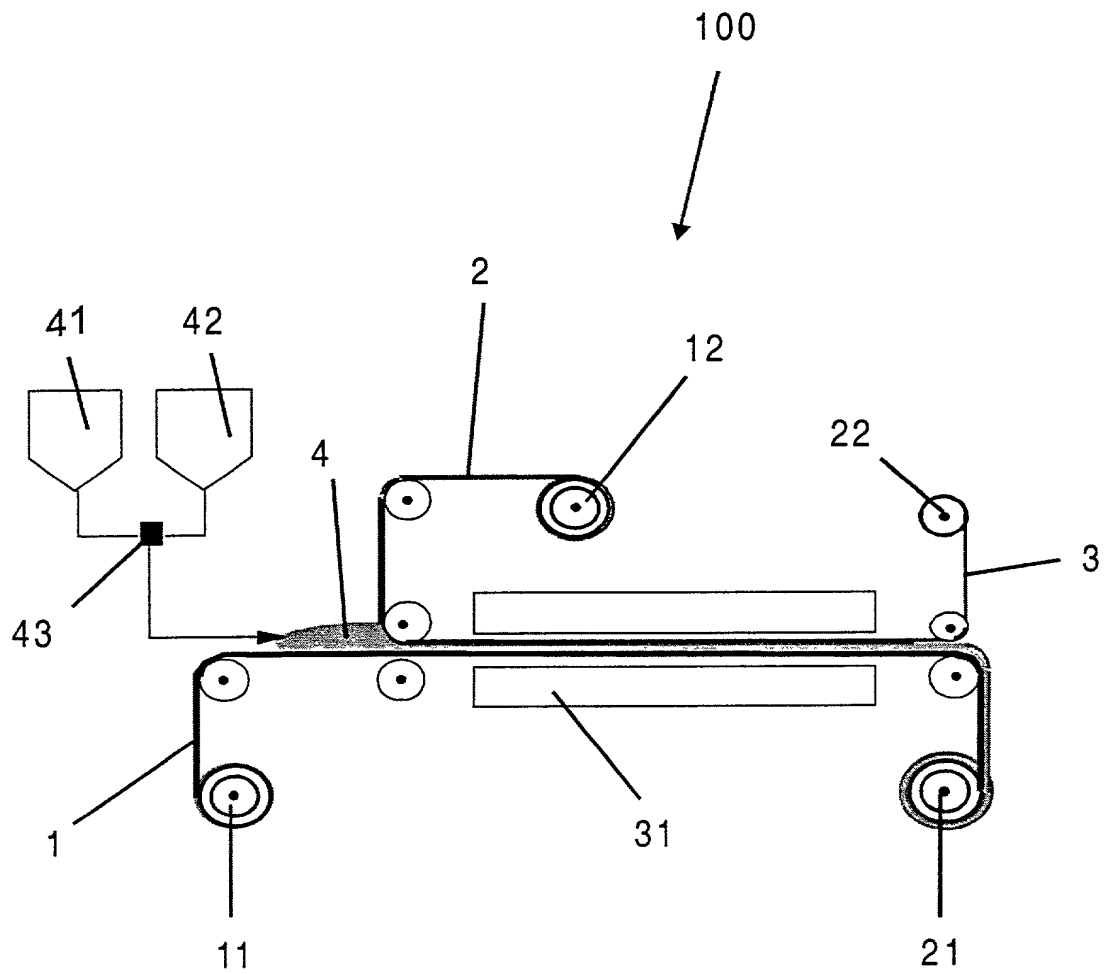


Fig. 1

COMBINATION DECLARATION & POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled „**Process for continuous manufacture of self-adhesive articles by coating incoming web-form materials with two-component polyurethanes**“ the specification of which is attached hereto.

-OR-

was filed on _____ as

Application Serial No. _____ and was amended _____

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			<u>Priority Claimed</u>
<u>199 51 902.1</u> (Number)	<u>Germany</u> (Country)	<u>28/10/1999</u> (Day/Month/Yr. Filed)	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no
<u> </u> (Number)	<u> </u> (Country)	<u> </u> (Day/Month/Yr. Filed)	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

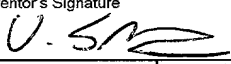
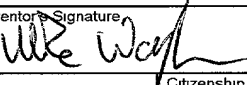
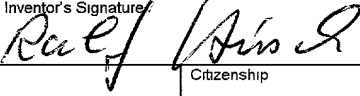
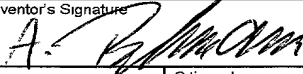

<u> </u> (Application Serial No.)	<u> </u> (Filing Date)	<u> </u> (Status) (patented, pending, abandoned)
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punished by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named Inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

Kurt G. Briscoe, Reg. No. 33,141; William C. Gerstenzang, Reg. No. 27,552; Carmella A. O'Gorman, Reg. No. 33,749, and Stephen G. Ryan, Reg. No. 39,015 all of 660 White Plains Road, Tarrytown, New York 10591-5144; William R. Robinson, Reg. No. 27,224; Mark A. Montana, Reg. No. 44,948 all of 721 Route 202-206, Bridgewater, New Jersey 08807; Lorimer P. Brooks, Reg. No. 15,155; Davy E. Zoneraich, Reg. No. 37,267 all of 805 Third Avenue, 9th Floor, New York, NY 10022, my attorneys with full power of substitution and revocation

Send Correspondence To: Norris McLaughlin & Marcus, P.A. 660 White Plains Road Tarrytown, N. Y. 10591-5144	Direct Telephone Calls To: (914) 332-1700
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Full Name Of Sole or First Inventor Dr. Uwe Schümann	Inventor's Signature 	Date 2.10.00
Residence Hollandweg 26A, D-25421 Pinneberg, Germany	Citizenship German	
Post Office Address Hollandweg 26A, D-25421 Pinneberg, Germany		
Full Name Of Second Inventor Ulrike Wappler	Inventor's Signature 	Date 4.10.00
Residence Moltkestraße 6, D-20253 Hamburg, Germany	Citizenship German	
Post Office Address Moltkestraße 6, D-20253 Hamburg, Germany		
Full Name Of Third Inventor Ralf Hirsch	Inventor's Signature 	Date 5.10.00
Residence Finkenweg 2, D-25451 Quickborn, Germany	Citizenship German	
Post Office Address Finkenweg 2, D-25451 Quickborn, Germany		
Full Name Of Fourth Inventor Andreas Bleckmann	Inventor's Signature 	Date 5.10.00
Residence Vogt-Groth-Weg 13, D-22609 Hamburg, Germany	Citizenship German	
Post Office Address Vogt-Groth-Weg 13, D-22609 Hamburg, Germany		
Full Name Of Fifth Inventor Andree Bernoth	Inventor's Signature 	Date 5.10.00
Residence Ulmenstraße 7, D-22299 Hamburg, Germany	Citizenship German	
Post Office Address Ulmenstraße 7, D-22299 Hamburg, Germany		
Full Name Of Sixth Inventor	Inventor's Signature	Date
Residence	Citizenship	
Post Office Address		
Full Name Of Seventh Inventor	Inventor's Signature	Date
Residence	Citizenship	
Post Office Address		

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